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MEETING OF PETROLEUM-AND-GAS AND CHEMICAL SOCIETIES

-USSR-

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FOREWORD

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MEETING OF PETROLEUM AND GAS AND CHEMICAL SOCIETIES

-USSR-

[Following is the translation of an article entitled "Joint Plenum of the Central Boards of the All-Union Chemical Society imeni D. I. Mendeleev and the Scientific-Technical Society of the Petroleum and Gas Industry on the Problem of the Development of Petrochemistry and Basic Organo-synthetics", by D. L. Margolin in Zhurnal Vsesoyuznogo Khimicheskogo Obshchestva im. D. I. Mendeleeva (Journal of the All-Union Chemical Society imeni D. I. Mendeleev), Vol. V, No. 4, Moscow, August 1960, pages 460-465.]

On 14 April 1960, the Joint Plenum of the Scientific-Technical Society of the Petroleum and Gas Industry and the All-Union Chemical Society imeni D. I. Mendeleev met in Moscow. Comrade V. S. Fedorov, chairman of the State Committee for Chemistry under the USSR Council of Ministers, presented a report on the problems facing these societies in connection with the fulfillment of the 7-year plan for petroleum chemistry and basic organic synthesis.

This report noted that the enormous plans of communist construction presuppose an accelerated development of the native chemical industry. In the next seven years there has to be a three-fold increase in the general volume of production. As we know, the production of synthetic materials requires an especially high rate of development. The production of artificial and synthetic fibres has to increase 4.4 times, of plastic masses and synthetic resins 8 times, and of synthetic rubber -- 3.4 times.

The main problem of the present development of the chemical industry lies in the production of the most important products of organic synthesis and ammonia, which, over these seven years, and unlike in the past, will be based on a wide utilization of inexpensive petroleum raw materials and natural gas.

By the end of the 7-year period, the following products will be made entirely from petroleum raw materials: polyethylene, polypropylene, polyvinyl chloride resin and synthetic fibres, 95% of synthetic rubber, 93% of capro lactam, 89% of ethylene oxide, 70% of acetaldehyde, 90% of butyl and isobutyl alcohol, 66% of phenol, 55% of ammonia, 81% of acetic acid and many of the other important products and by-products of organic synthesis.

This radical change in the raw material basis of the rapidly-developing chemical industry is in need of close cooperation with the collectives of the petroleum-gas extracting, petroleum refining and the chemical industries. Disregarding the enormous richness of our raw-material resources, the petro-chemical industry in our country, as far as it has developed, lags considerably behind that of the US.

Such abnormal conditions, as the May (1958) Plenum of the Central Committee of the Communist Party of the USSR correctly noted, are, above all, the result of an underestimation of the role of hydrocarbon petroleum derivatives in the production of synthetic materials by the petroleum industry, from the point of view of former ministries of the chemical and petroleum industry and other branches of scientific research institutes. Departmental discord intensified this unpleasant condition and caused the development of the organic synthesis industry's large-scale production to be, for a long time, based primarily on the use of organic raw materials and expensive coke.

In its part, the technique of obtaining hydrocarbon raw materials, i.e. ethylene, propylene, butylene and aromatic hydrocarbons, used by many petroleum refineries and petrol plants, does not meet the requirements of the synthetic materials industry. In order to insure the production of high quality organo-synthetics, it is necessary to have ethylene, butylene, propylene of 99.9% purity and not in a mixture with various extremeous compounds.

If in the near future the petroleum specialists will solve the problem of obtaining pure ethylene, propylene, butylene and also the problem of eliminating aromatic hydrocarbons, in that very way they will cut a clear road to the organization of production of more valuable materials. So, for example, the extraction of propylene with a high degree of purity would allow the organization of a production of the remarkable acrylonitrile and on this basis, the production of wool-substitutes.

Comrade Fedorov noted that in the two years after the May plenum of the TSK KPSS, the general level of the industrial production of chemical products rose by 24% over 1957. Of that portion, the production of plastic masses and synthetic resins rose by 25.6% and chemical fibres by 20.4%.

Capital investments in the chemical industry have more than doubled in size since 1957. Additional processes worked by the organization and given over to 135 industries such as the viscose cord and viscose silk industry, latex, polyurethan, plastics, and the synthetic resin and polyethylene industries for exploitation in the production of ammonia and a number of other products.

In 1959, the research work of the collectives for planning and scientific experimental organizations has insured the completion of the planned projects which were 1.5 times as extensive as those of 1958. At the same time, besides the preparation of project documents for 1959-1960, planning organizations reviewed 114 projects and

plans; the introduction of a number of more progressive technical solutions was responsible for a great decrease in construction costs.

In 1958-1959, the scientific research institutes and plant laboratory collectives solved a number of important problems that were directly related to the construction and reconstruction of extraction and refining of polymers, whose production depends on cooperation with the program of development of the chemical industry in the next seven years. So, for example, the All-Union Scientific Research Institute of the Petroleum Industry, the Leningrad Institute for Polymer Plastics and the Giproplast collectives have worked out a technical process for extracting polyethylene through tubular reactors and have also completed the work on extracting polyethylene from low pressure metallo-organic catalysts. This new polymeric material as polypropylene, polyformaldehyde and polycarbons, which play a significant role in our country's national economy were discovered in the scientific research organizations of the USSR Academy of Sciences, the National Committee on Chemistry under the Council of Ministers of the USSR and the Sovnarkhoz (Sovet Narodnogo Khozyaystva -- Council on National Economy).

In his report, Comrade Fedorov pointed out that it is the problem of the society to extend the efficiency of its principal organizations as, in the name of communist victory, this will insure the general fulfillment of our plans on time and ahead of time.

This is most urgent and is in addition related to the fact that in various cases there is a lag both in the field of capital management and introduction of new standard and in the field of project and scientific research work.

Up to now, collectives of the scientific research institutes of the Petroleum Industry and the Okhtenskiy Chemical Combine of the Leningrad Sovnarkholz have not become familiarized with the process of extracting polyethylene with a mixer from a reactor under high pressure even on the industrial experimental level even though the data for this process were supposed to have been received in 1958. The Scientific Research Institute for Synthetic Rubber worked out a technique of gaseous polymerization of isoprene, but delayed announcing the acquired data until they finished testing the project of isoprene rubber production in the best possible way through polymerization of isoprene in solution. This placed the utilization of the project and the organization of the production of this rubber at the Sterlita-maksk Synthetic Rubber Plant in a difficult position.

Certain other problems are also the causes of this lag. This seems to prove that the actual conditions of organizations devoted to scientific research, experimentation and projects, still do not meet the standards set by the May (1958) and June (1959) plenary meetings of the TK KPSS.

The organizations scientific research and experimentation has failed to effect a sharp decrease in the time it takes to intro-

duce the new technological processes. Everything is not as yet done according to institute planning and independently of the old convictions that advocated concentrating strength and means of the leading institutes and laboratories on a qualified solution of complex scientific and technological problems. Duplication of effort has not been eliminated from all areas and order has not been introduced into the coordinated research work by leading institutes and principal chemists for more meaningful results. All of these things decrease the effective utilization of materials and creative efforts of the scientists in the development of more important scientific research and experiments. A lot of effort and means is concentrated in areas that do not actually play a significant role in the utilization of advanced technology in industrial production and theoretical work is badly coordinated with the examination of relatively important problems.

Lags in plan fulfillment give rise to great problems in the fundamental organization of the chemical industry. Also problems connected with the introduction of new production methods are made clear by delays in the provision of project documentation, materials and also outfitting.

The reporter emphasized that societies should be influenced to work in the direction of mobilizing their engineers and technicians to help the major basic chemical industry projects now under way in exploring local resources for the completion of various construction and participating in the introduction and adoption of new techniques; wide exploration and utilization of the possibilities of useful enterprises through their reconstruction, extension and technical rearmament, can show real influence on progressive construction, on the timely introduction of new methods and can effect a sharp rise in the output of the chemical industry. This remarkable fact proves that it will really work. In answer to the questions posed by the TK KPSS and the USSR Council of Ministers, in March of last year, the collectives of the scientific research and project organizations together with the economic, party and trade-union organizations examined and submitted 560 proposals, whose practical realization in 1959-1965 will effect a saving of about billion rubles in the chemical industry's investments, increase the production of the more important chemical products in regard to reconstructions and allow an increase of operating chemical establishments and also a partial increase in the number of construction projects.

The expansion of this remarkable example lets us gain time and opens unlimited possibilities for creative activities among the members of the scientific-technological societies to an even greater extent since the reserves used by the chemical enterprises, gas and petroleum refineries have scarcely been used in the nationwide effort to hasten the development of the more important aspects of chemical production.

In his report, comrade Fedorov posed a question of wide control

of the more important problems in the development of the petro-chemical production and basic organic synthesis by the scientific-technical public, in such areas as the production of acetic acid from normal butane instead of the complicated process of producing it from acetaldehyde which can be obtained only on a definitient acetylene base; research in the area of direct oxidation that would open the way to a more direct technological approach to the industrial production of acetaldehyde from ethylene and acrylene from propylene with glycerine as a by-product instead of the expensive and complicated chlorine method; obtaining acrylonitril through direct oxidation of propylene and ammonia instead of the inferior usual method of condensing acetylene and hydrocyanic acid.

The extraction of acrylonitril from propylene, acetaldehyde from ethylene and acetic acid from butane is also important because we have the raw materials needed for their production in unlimited quantities, which cannot be said about acetylene. These and many other examples show that the present-day condition of chemistry and the possibilities of petro-chemical production allow us to find and discover a direct, single-stage and original synthesisic process that would facilitate the organization of industrial production of chemical products on the basis of introducing the progressive processes of industrial technology into large-scale production.

The existing characteristics of similar processes show great possibilities for their immediate introduction at petroleum refineries with small capital investments.

Comrade Fedorov's proposal for a greater attraction of all-purpose brigades to help fulfill scientific research and experimental work and also for a significant effort in the work of the central plant laboratories was supported by a number of members of the plenum that participated in the discussions.

Academician Vol'fkovich (vice-chairman of the Central Committee of the All-Union Chemical Society imeni D. I. Mendeleev), comrade Sedin (vice-director of the Institute for Petro-Chemical Synthesis at the USSR Academy of Sciences), comrade Nazarov (head of the Chemical Board of the Kuybyshevskiy Sovnarkhoz) have noted, that the complex brigades that assure creative cooperation among scientists, engineering technicians, project workers and plant workers in finding new technological processes at all stages, beginning with laboratory experiments, project examination and ending with initiation production, cause a significant acceleration of the process of introducing new progressive processes into industrial technology.

The members of the plenum, who were the representatives of the basic economic regions already defined as the principal ones in the area of petroleum chemistry and fundamental organic synthesis - comrades Arenbrister (vice-chairman of the Tatar Svonarkhoz), Vorobyants (head scientist at the Kazan Branch of the AN USSR Academy of Sciences), Mingareyev (head engineer of the Petroleum Division of the Tatar

Sovnarkhoz), Nazarov (Kuybyshev), Strigin (chief of the central Laboratory of the Chernorechenskiy Chemical Plant), Dorogochinskiy (vice-director of the Groznenskiy Scientific Research Petroleum Institute), Shakhiyev (Prof at the Institute for Petro-Chemical Processes at the Azerbaydzhan SSR Academy of Sciences) - presented the analysis of resources and possibilities of their regions and ways for their practical exploitation. Investment of capital in the petro-chemical enterprises, as already pointed out, proved greatly effective; in the Tatar area, for example, it paid for itself in one to three years of operation.

The members of the plenum discusses a number of problems connected with the development of the petro-chemical basic organic synthesis industries: the significance of ionites and the necessity of increasing their production (prof. Isagulyants -- Moscow Institute for Petro-Chemistry and Gas Industry imeni Gubkin); the significant increase in the demand for lubricants, applicable to the needs of present day technology that cannot be satisfied only through the distillation of petroleum and the necessity to increase the work in the area of synthesis and production of supplements (comrade Dobkin -- director of the Leningrad Petroleum Oil Refinery imeni Shaumiana); the keen necessity to develop the production of research materials and a significant increase in the work of extracting pure and ultra-pure materials (comrade Sedin); the unsuitability of organizing petroleum refineries within a great complex of petro-chemical production (comrade Makarov -- vice director of the National Research Institute of the Petroleum Industry); the necessity for joint discussion between petroleum workers and chemists of the general perspectives in the development of the petroleum refineries and the petro-chemical industry in the basic raw material regions - Pashkir, Tatar, Checheno-Ingushet and others (comrade Yakovlev -- chief of the Gipro-kauchuk Division); and the expediency of developing a complex thermo-oxidizing pyrolysis in the process of extracting acetylene and olefin from gaseous raw materials (comrade Strongin).

An especially sharp discussion ensued on the problems of resources, of raw materials for the development of the petro-chemical industries, the distribution, types and scale of the undertakings and also on the perspectives of the development of syntheses on the basis of acetylene or ethylene (comrades Fedorov, Fedorenko, Yakovlev, Makarov, Mingareyev). At this point it was emphasized that a synthesis has to be developed on an acetylene basis, according to the present technologically economic advantages of this method in relation to the other experimental synthesis methods for the same product.

The long discussions of the problems in the development of the petro-chemical and basic organic synthesis industries by the Joint Plenum of the Central Boards of the All-Union Chemical Society imeni D. I. Mendeleev and the Scientific-Technical Society of the Petroleum and Gas Industry, proved to be most expedient and useful, according to the unanimous evaluation of its participants.

In the decisions of the TK KPSS Presidium and the USSR Council of Ministers, one notes that the basic feature in the development of the chemical industry in the next seven years is that the production of the most important products of organic synthesis and ammonia (other than in the previous years) has to be based on a broad utilization of our vast resources of inexpensive petroleum raw materials and natural gas.

In our country, the principal economic regions in the development of the petro-chemical and organic synthesis industry from the various hydrocarbonic raw materials are: Bashkir, Tatar, Checheno-Ingushskaya ASSR, Azerbaydzhan SSR, Kujbyshvskaya Oblast; Irkutskaya, Saratovskaya, Stalingradskaya, Tul'skaya, Gor'kovskaya and Stanislavskaya Oblasti (Regions) and Krasnodarskiy Kray (Area).

One of the basic problems in the practical activities of the organizations under the All-Union Chemical Society imeni D. I. Mendeleev and the scientific-technical Society of Petroleum and Gas Industry has to be seen in the mobilization and concentration of efforts of the members of these societies on an accelerated practical solution of the questions connected with the wide utilization of hydrocarbonic raw materials and complex development of the petroleum and petro-chemical industries.

In spite of this fact neither of the indicated societies collaborated in the struggle for the solution of the nationwide problem of an accelerated development in the chemical industry and especially, and what is more important, the creation and development of native petro-chemical industry and organic synthesis industry (in the two years after the May plenum of the TK KPSS in 1958).

In possession of tremendous opportunities, the organizations of both societies have utilized them poorly in strengthening scientific research in the development of new petro-chemical processes and the processes of organic synthesis, in the acceleration and basic improvement in project-planning and also in working out general schemes for the complex development of petroleum and chemical industry in the principal economic regions.

In the individual economic regions (Bashkiya, Tatariya and others) the society organizations have undertaken several measures to help the development of petro-chemical industry. In a way, this work was done separately; it was not directed toward a solution of greater problems on a larger scale. One of the significant shortcomings in the work of both societies seemed to lie in the fact that they did not strive to mobilize the creative initiative of their members and organizations, and direct them toward a speedy surmounting of the difficulties faced in solving the many problems of developing the domestic petro-chemical industry and organic synthesis industry.

The Joint Plenum has ordered the central, republican, kray and oblast' administrations to work out, in a period of two months a schedule of measures for 1960-1961 for the organizations of the All-

Union Chemical Society imeni D. I. Mendeleev and the Scientific-Technical Society of the Petroleum and Gas industry, directed to show concrete aid to planfulfillment in the related industries.

Considering the fact that one of the key problems in the development of the petro-chemical industry seems to be the complex utilization of petroleum raw materials, including first and foremost the by-product and natural gases in petro-chemistry, the Plenum made the following recommendations to the societies:

a) To call an all-Union Conference on the complex utilization of petroleum raw materials, natural gasses and condensates in the fourth quarter of 1960;

b) First of all, to settle the preparations for the All-Union Conference, to undertake republican oblast' and kray conferences in the above-mentioned economic regions in question, to have a detailed discussion of the technological, technical and economical problems in the utilization of petroleum raw materials and natural gases in petro-chemistry.

At these conferences, to examine the condition and the best way for a rational development of petroleum refining and the chemical industry as related to concrete conditions in the existing and operating industries, and to consider the general organization of large-scale production.

The plenum has obliged the republic, kray and oblast' administrations and the principal organizations of both societies to undertake, in the shortest possible time, a study of the concrete reasons for set-backs in introducing new technological processes in the areas of petro-chemistry and organic synthesis and with the greatest possible attendance of the members of both societies, to discuss the recommendations for maximum speed-up of projects of scientific research and construction according to the planned processes.

The plenum admitted that the organization of continuing creative collaboration between the administrations of both societies is indispensable. Collaboration is also necessary between the councils of the principal organizations for scientific research and project institutes of the chemical, petroleum and gas industry and especially for the solution of such important problems as:

a) Use of the newest achievements of science and technology in scientific experiments, in introducing new combines technological processes and attaining the indispensable purity level for raw materials and final products;

b) Perfecting new apparatus, fixtures, machinery, mechanisms, schemes and means of mechanization, automatization, and remote control that are indispensable to the creation of the modern large-scale production;

c) Perfection of new high-quality construction materials and also the reduction of metal expenditures by replacing them with less expensive materials;

d) The taking of the greatest possible precautions with the use of the existing technological processes and fullest precautions for industrial drainage and atmospheric pollution.

It is recommended to both administrations of the societies in the above mentioned economic areas to create joint committees of commissions for unified action toward the accelerated development of petro-chemical production and organic synthesis products, leaving up to them:

a) Examination of the problems connected with the cooperation with other industries and sovmarkhozes;

b) Establishing creative scientific research brigades of specialists, project and construction organizations and plants, aimed to collaborate on the fastest invention of the most important new technological processes, the adoption of measures for a maximum decrease in failures to meet the project deadlines, decrease in construction expenditures, especially through apparatus-consolidation, maximum introduction of combined processes, decrease in specific expenditures through a wide use of complex mechanization and automation;

c) The organization of general specialization in the efforts of the members of these societies on projects, industries and plants for petro-chemistry and organic synthesis with the purpose of applying the newest techniques of domestic and foreign science and technology;

d) Extending manifold aid in construction, operation and adoption of new technological processes and undertakings;

e) Extending manifold aid to the plant laboratories.

In the first place, the society organizations have to evaluate and work out standards for establishing the most progressive processes in a particular oblast':

a) The output of hydrocarbon raw materials with a petroleum base (ethylene, propylene, butylene and dienes and also benzene and xylene);

b) Purification of olefins and aromatic hydrocarbons, used as raw materials for chemical experimentation;

c) The production of polyethylene, ethylene oxides and related products, ethylene copolymers and propylene (plastics and rubber), ethyl alcohol, acetaldehyde from ethylene (by direct synthesis), chloride producing ethylene, styrene, polypropylene, sulphanol, phenolacetone, acrylene, glycerine, oxide of propylene and products of its refining, oily aldehyde;

d) The extraction of acrylonitrile (simultaneous with the oxidation of propylene and ammonia), acetic acid (through the oxidation of butane), Epsom salts (from divinyl through dichlorobutane), acetylene through thermooxidation by pyrolysis and electro-cracking, (higher olefins on the basis of cracking paraffin hard; it is recommended to the society administrations that they announce competitions for the best schemes for the above mentioned processes and production for 1960;

e) The organization of extensive research and experimentation for the introduction of new domestic and more economically effective technological processes.

The central, republic, oblast' and kray administrations and councils of the principal organizations of both societies must on a large scale:

a) hold lectures, reports, creative discussions, seminars on specific topics of the newest accomplishments of science and technology in the chemical, petroleum and gas industries;

b) Hold seminars, courses and study circles to popularize the new technological processes, principles, apparatus machines and mechanisms;

c) Establish courses and schools on the outstanding problems for specialists and workers, especially on the faster transmission of their findings to the principal related industries;

d) Get extensive information on the foremost foreign and native scientific and technical achievements in petroleum and gas industries;

d) Organize specific scientific assignments and excursions into principal related organizations for scientific research and projects and experimentation in chemistry, petroleum and gas industry and also in other related industries with the aim of promoting education and interest in major experiments.

The central administrations of the societies have to prepare proposals on the organization of command units for complex brigades in the specialized chemical, petroleum and gas industries into foreign countries for the purpose of studying the most important scientific and technical problems.

The Joint Plenum accepted the decision to ask the State Committee on Chemistry under the USSR Council of Ministers, to discuss the problems that arose at the Joint Plenum of the Central Committees of the Societies, partly on the increased production of ionites, their wider utilization in industry and the problems of raw materials in the production of effective petroleum by-products in an attempt to raise the number of available fuels and oils.

The Joint Plenum turned to the Central Administrations of the Scientific-Technical Societies for Mechanical Engineering and Instrument Making with an invitation to organize controls to insure a quicker establishment and output of indispensable quantities of equipment for the use of chemical and organic synthesis production and also the means and instruments of control and automatization.

It is suggested that organizations of these societies elucidate the problems of the development of petro-chemistry and organic synthesis, regularly and more extensively, and particularly the production of polymers in the Scientific Technical Societies' periodical and specialized publications.

The Joint Plenum of the Central Committees of the All-Union Chemical Society imeni D. I. Mendeleev and the Scientific-Technical

Society of the Petroleum and Gas Industry called the members of their societies, all the scientists, engineers, technical workers and leading inventors to participate actively in the struggle to fulfill the Party and Administrative directives for the quicker establishment and acceptance of the work of the petro-chemical and organic synthesis industry in order to fulfill and over-fulfill state plans in these branches of industry.